



# UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE  
United States Patent and Trademark Office  
Address: COMMISSIONER FOR PATENTS  
P.O. Box 1450  
Alexandria, Virginia 22313-1450  
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/691,944	10/23/2003	Lowell D. Bok	4865-153	6320
757 7590 07/08/2008 BRINKS HOFER GILSON & LIONE P.O. BOX 10395 CHICAGO, IL 60610				
EXAMINER				
SMITH, FRANCIS P				
ART UNIT		PAPER NUMBER		
1792				
MAIL DATE		DELIVERY MODE		
07/08/2008		PAPER		

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

# Office Action Summary

## Application No.

10/691,944

## Applicant(s)

BOK ET AL.

## Examiner

Francis P. Smith

## Art Unit

1792

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

## Status

- 1) ☒ Responsive to communication(s) filed on 23 October 2003.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

## Disposition of Claims

- 4) ☒ Claim(s) 1-46 is/are pending in the application.
- 4a) Of the above claim(s) 30-41 is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-29 and 42-46 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

## Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 23 October 2003 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

## Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

## Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO/SB/08)  
Paper No(s)/Mail Date 1/26/2004/6/4/2004/8/21/2006.
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date \_\_\_\_\_.
- 5) ☐ Notice of Informal Patent Application.
- 6) ☐ Other: \_\_\_\_\_.

## **DETAILED ACTION**

### ***Election/Restrictions***

1. Applicant's election of Group 1 in the reply filed on May 15, 2008 is acknowledged. Because applicant did not distinctly and specifically point out the supposed errors in the restriction requirement, the election has been treated as an election without traverse (MPEP § 818.03(a)).
2. Claims 30-41 are withdrawn from further consideration pursuant to 37 CFR 1.142(b) as being drawn to a nonelected invention, there being no allowable generic or linking claim. Claims 1-29 and 42-46 are currently pending and examined on the merits.

### ***Drawings***

3. The drawings are objected to because the numeric indicator for "pre-heater" (16) of figure one apparently corresponds to two lines. In addition, the hand written reference numbers with regard to figure 13 are confusing. Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The figure or figure number of an amended drawing should not be labeled as "amended." If a drawing figure is to be canceled, the appropriate figure must be removed from the replacement sheet, and where necessary, the remaining figures must be renumbered and appropriate changes made to the brief

description of the several views of the drawings for consistency. Additional replacement sheets may be necessary to show the renumbering of the remaining figures. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

***Claim Rejections - 35 USC § 102***

4. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

5. Claims 1, 3-7, 8, 9, 11, 13-17, 18, 19, 22, 23, 25, 42, and 43 are rejected under 35 U.S.C. 102(b) as being anticipated by Froberg (3,944,686).

Regarding claims 1, 4-6, 11, 14-16, and 23, Froberg teaches a method for vapor depositing pyrolytic carbon on porous sheets of carbon material. Specifically, an elongated continuous porous sheet of fibrous carbon (i.e. porous material) is longitudinally traversed through a reduced pressure heating zone (i.e. loading the porous material into a CVI chamber) while introducing a reactant gas onto the heated porous sheet (i.e. densification/infiltration) (see abstract; col. 2, line 65-68). The sheet moved through guide slot 38 with polycrystalline graphite plates 36 and 40 located

above and below the guide slot, whereby the plates are capable of acting as an electrical resistance element for heating slot 38 (see fig. 1; col. 4, lines 1-10).

Claims 3 and 13, Froberg teaches removing the porous structures from the chamber after a heat treatment, which will inherently cool the porous material.

As per claims 7, 17, and 25, Froberg does not explicitly disclose a reverse gas flow process; however, once the reactant gas is introduced into the chamber, the gas will interact with the heating plates and will inherently have the same effect as the reverse flow rate of the second pre-heater of the instant application (col. 4, lines 1-10).

For claims 8, 9, 18, 19, 42, 43, Froberg discloses a reactant gas mixture comprising acetylene, natural gas, methane, etc (col. 3, lines 17-26), whereby natural gas inherently contains propane.

Regarding claim 22, Froberg teaches processing pressures within the range of 50-760 torr (col. 3, lines 9-16).

### ***Claim Rejections - 35 USC § 103***

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

7. The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

Art Unit: 1792

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

8. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

9. Claims 2, 10, 12, 20, 24, 26-29, and 44-46 are rejected under 35 U.S.C. 103(a) as being unpatentable over Froberg (3,944,686).

For claims 10 and 20, Froberg discloses a reactant gas mixture comprising acetylene, natural gas, methane, etc (col. 3, lines 17-26). Natural gas is a mixture of gaseous hydrocarbons with methane as the chief component while the balance is composed of varying amounts of ethane, propane, butane, and other hydrocarbon compounds. Therefore, propane is necessarily present in the mixture. Choosing specific percentages of methane and propane as per claims 10 and 20 would have been within the level of ordinary skill in the art at the time of the invention.

Regarding claims 2, 12, and 24, Froberg teaches the porous sheet is divided into

a number of separate sheets by cutter 46 (see fig. 1; col. 3, lines 35-40). Once the porous material is cut into pieces, it would have been obvious to one skilled in the art at the time of the invention to place the pieces of porous sheets into a module or container in order to store or ship the densified porous material without damage or loss of said sheets.

As per claims 26 and 45, Froberg teaches a method for vapor depositing pyrolytic carbon on porous sheets of carbon material. Specifically, an elongated continuous porous sheet of fibrous carbon (i.e. porous material) is longitudinally traversed through a reduced pressure heating zone (i.e. loading the porous material into a CVI chamber) while introducing a reactant gas onto the heated sheet (see abstract). The sheet moved through guide slot 38 with polycrystalline graphite plates 36 and 40 located above and below the guide slot, whereby the plates are capable of acting as an electrical resistance element for heating slot 38 (see fig. 1; col. 4, lines 1-10). Froberg does not expressly teach placing the material into a module or loading the module into said CVI chamber. However, Froberg teaches cutting sheets upon infiltration with pyrolytic carbon. Once the porous material is cut into pieces, it would have been obvious to one skilled in the art at the time of the invention to place the pieces of porous sheets into a module or container in order to store or ship the densified porous material without damage or loss of said sheets. It would be also obvious to cut porous sheets to the required size prior to processing in order to eliminate leftovers of processed material and then place cut material in the module before loading into the deposition chamber in order to prevent cut material from dispersing throughout said chamber during infiltration

with pyrolytic carbon, since selection of any order of performing steps is prima facie obvious in the absence of a new and unexpected results (Consult *In re Burnhans*, 154 F.2d 690, 69 USPQ 330 (CCPA 1946)).

For claims 27 and 28, Froberg teaches heater plates above and below said module/porous material (col. 4, lines 1-10).

For claim 29, Froberg does not explicitly disclose a reverse gas flow process. However, once the reactant gas is introduced into the chamber, the gas will interact with the heating plates and have the same effect as the "reverse flow rate" of the instant application (col. 4, lines 1-10).

As per claims 44 and 46, Froberg teaches a sheet is moved through guide slot 38 with polycrystalline graphite plates 36 and 40 located above and below the guide slot, whereby the plates are capable of acting as an electrical resistance element for heating slot 38 (see fig. 1; col. 4, lines 1-10). Froberg does not expressly disclose the dimensions for the heat plates; however, it would have been within the level of ordinary skill in the art at the time of the invention to optimize the shape of the heater plates in order to minimize the cooling effect of the incoming gas and to provide uniform heating of the substrate with the reasonable expectation of success.

10. Claim 21 is rejected under 35 U.S.C. 103(a) as being unpatentable over Froberg (3,944,686) in view of Sekiya et al. (JP 408002976A).

As per claim 21, Froberg does not expressly teach a temperature in the range of 1700-2500°F.



Sekiya teaches a method for producing a carbon fiber/carbon based matrix composite material prepared from carbon fibers according to a chemical vapor infiltration method (CVI method) whereby the temperature is regulated at 1200-1300°C, which is within the claimed range (see abstract). Therefore, one having ordinary skill in the art at the time of the invention would have utilized the temperature range as taught by Sekiya in Froberg's CVI method in order to densify a porous material at lower temperatures, thus saving energy and decreasing the cost of processing in Froberg's method with the reasonable expectation of success.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Francis P. Smith whose telephone number is (571) 270-3717. The examiner can normally be reached on Monday through Thursday 7:00 AM-5:00 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Mikhail Kornakov can be reached on (571) 272-1303. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Art Unit: 1792

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

FPS

/Michael Kornakov/

Supervisory Patent Examiner, Art Unit 1792